A Machine for Freeing Seed of Chemicals

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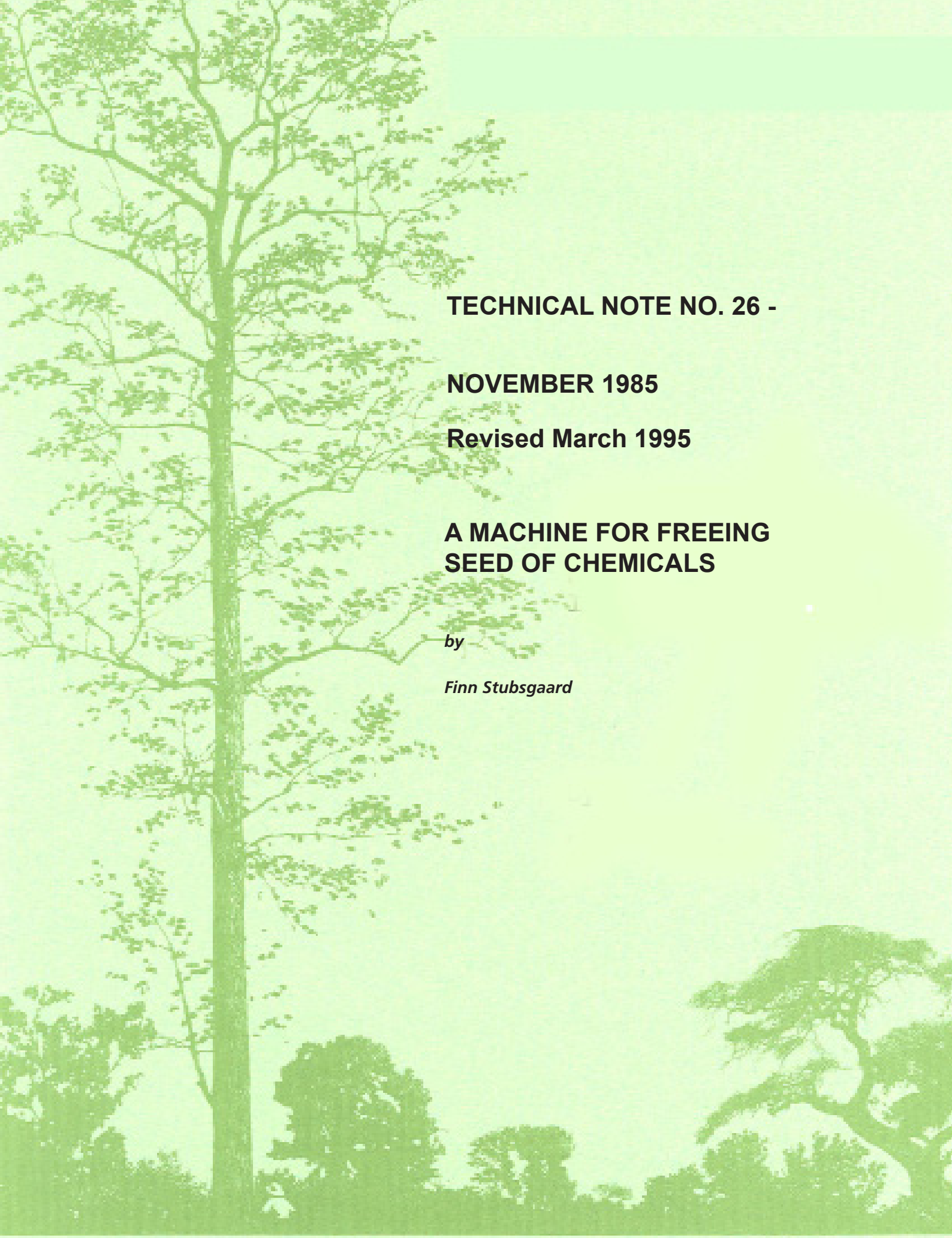

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A MACHINE FOR FREEING SEED OF CHEMICALS

by

Finn Stubsgaard

DANIDA FOREST SEED CENTRE

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Danida Forest Seed Centre (DFSC) is a Danish non-profit institute which has been working with development and transfer of know-how in management of tree genetic resources since 1969. The development objective of DFSC is to contribute to improve the benefits ofgrowing treesfor the well-being ofpeople in developing countries. DFSC's programme isfinanced by Danish International Development Assistance (Danida).

1. INTRODUCTION

Danida Forest Seed Centre often receives seed smothered with powdered fungicides and I or pesticides. Information on the chemicals used is often missing, which means that seed is repacked, representative samples are taken, laboratory tests are made and seed is stored with probably quite dangerous chemicals. Moreover, certain chemicals may affect the viability of the seed.

The fungicides and pesticides contain adhesive matter, which makes them difficult to remove from the seed.

Seed merchants in England and Denmark have (1) used standard seed-cleaning machines with strong suction, or (2) cleaned the seed in sieves in fume cupboards, or (3) washed it with water and dried it in a heated airstream (25 40° C), or (4) made those who worked with the treated seed wear dust- and gasmasks and limited the work to six hours twice a week.

These methods, however, are not sufficient to prevent the staff members' contact with the chemical dust or with evaporating gases. The gases are also able to penetrate the skin and protective material such as plastic gloves.

It is, therefore, highly desirable to be able to free the seed of chemical dust in a way that is reasonably safe for the seed as well as for the staff.

2. THE CLEANING MACHINE

- The machine has been developed so that it meets the following demands:
- The seed is cleaned without any noticeable decrease in germination.
- The seed remains a homogeneous mixture throughout the whole process, and representative samples for seed weight, humidity and germination tests can be drawn.
- Up to 10-20 kg can be handled as one batch.
- It is possible to weigh out and pack samples or portions up to 100 gr (± 1/2 g), or to reload the seed into new containers, directly from the machine.
- The machine can clean large amounts of seed at a reasonable speed.
- The price of the materials for the machine is moderate, and the machine is easy to build and operate wherever electricity is available.

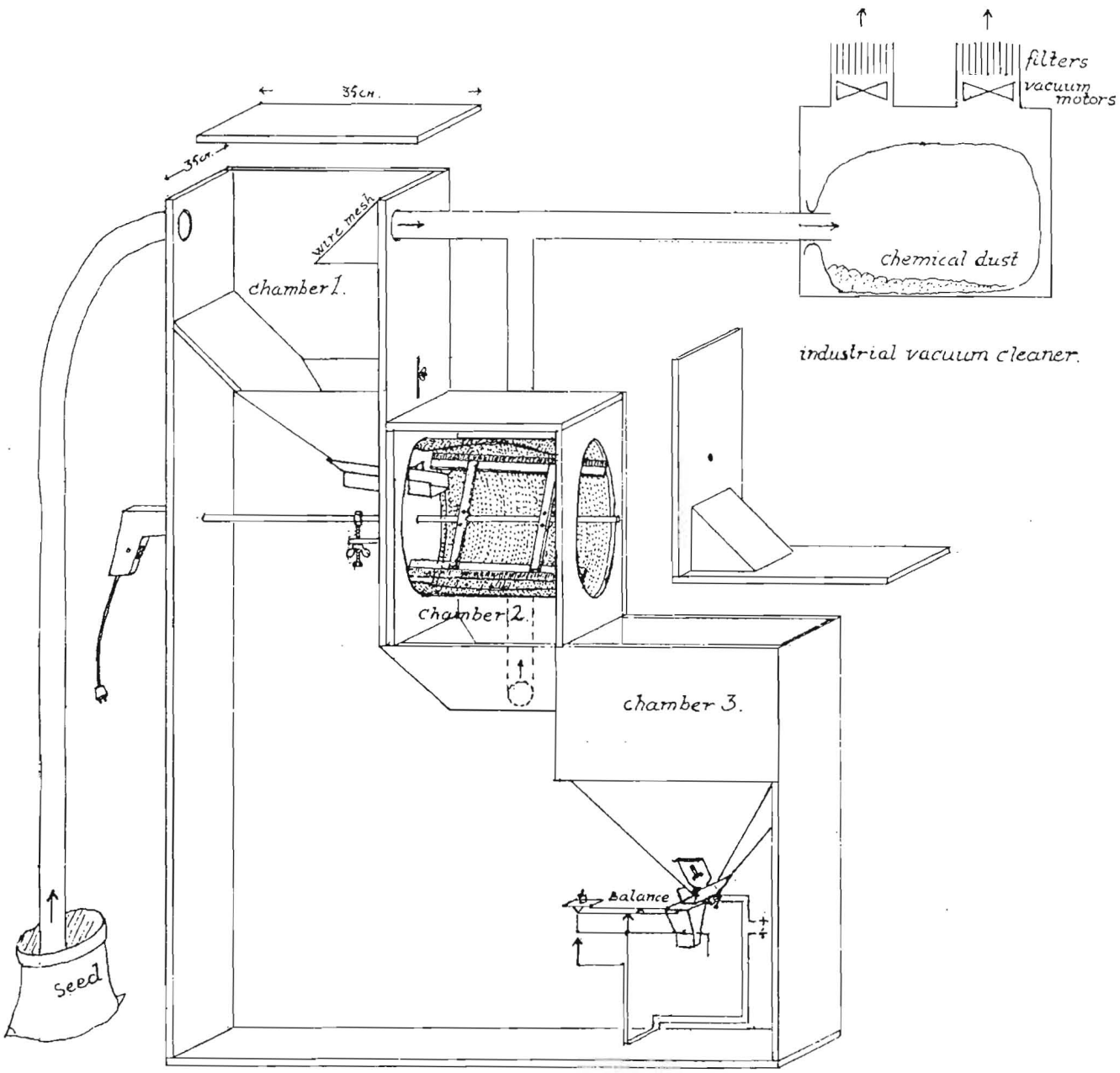

Figure 1: Cleaning Machine with front pieces removed Sketch 1:10

It is not essential to keep the dimensions mentioned in the figure. They may be chosen to fit easily obtainable parts.

More complete building instructions can be obtained from the Danida Forest Seed Centre.

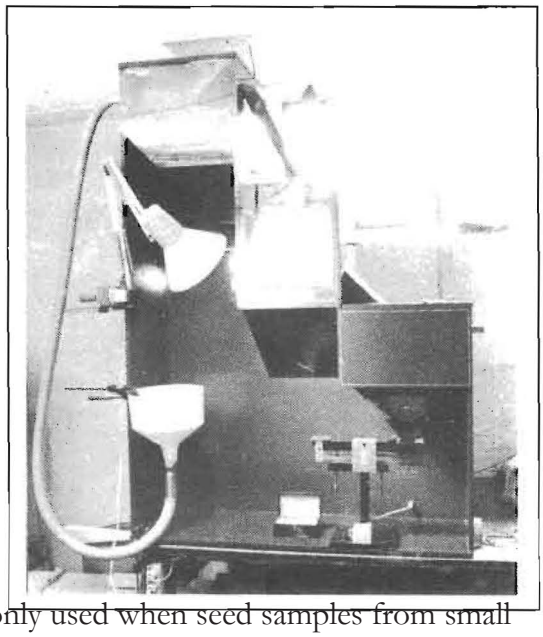

Figure 2. Front view of the Seed Cleaning Machine.

The plastic funnel at the end of the hose is only used when seed samples from small plastic bags are to be cleaned. Otherwise the bag would be sucked into the machine with its seed.

3. MODE OF OPERATION

The machine is built as a closed system operating under vacuum. This is generated by a vacuum cleaner located in the open, outside the room occupied by the machine.

The vacuum cleaner sucks the seed into chamber no. 1 via a hose leading directly from the original seed container.

From this chamber the seed runs at an even speed into one end of the second chamber which contains a drum made of perforated metal sheeting. Two brushes rotate at up to 150 rounds per minute inside the drum, brushing the seed free of chemical dust and at the same time bringing the seed towards an outlet at the other end of the drum at an adjustable speed.

After leaving the drum, the seed is collected in the third chamber. It is now so clean that there is not much odour of the chemicals, which are in themselves very strongly smelling.

The seed is let out automatically from an electrical vibrating slide in the bottom of the third chamber and into a funnel on the balance. When the required amount of seed has been let out, the balance releases an electrical switch for the slide and the seed flow is stopped. This amount of seed can then be let out through a leaf valve in the bottom of the funnel into a plastic bag or other container for storage or shipment. If the balance is removed, the seed can be loaded directly into larger containers.

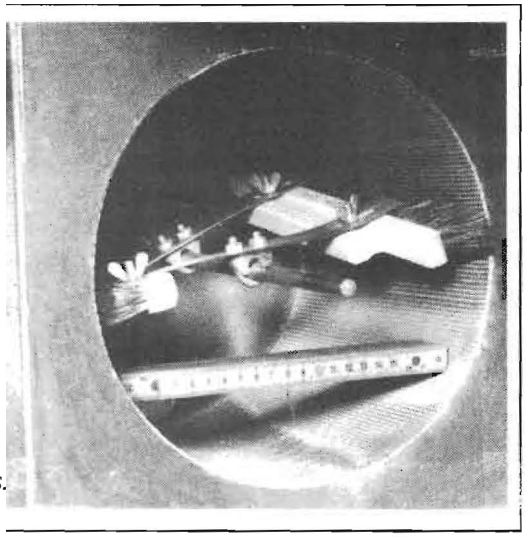

Figure 3. Interior view of second chamber with drum and brushes.

The dust is sucked from the first and second chamber into a bag in the vacuum cleaner. This bag withholds almost all the dust while a small amount is held back by filters at the exhaust. The filter-bag and the filters are changed and disposed of by destruction.

Where the country or region has a plant for the destruction of chemicals, this is where the bags and filters should be disposed of . Where this is not the case, the problem of safe disposal of chemicals must be solved according to the country's legislation. Great care must be exercised in the effort to get rid of the chemicals in the safest possible way.

4. SPECIFICATIONS

The vacuum cleaner used to generate the vacuum is a Danish Nilfisk GS 82 industrial cleaner giving a vacuum of 18500 pascal (an airstream of 52 liter per second) using 1400 watt.

The filters are made by Nilfisk and meet the following standards:

Particle sizes 0.6 - 0.9 micron	100 %
British Standard 3928/65 (sodium flametest)	99.999 -
DIN 24184 (radioactive indicated atmospheric aerosel, particles larger than 0.3 micron)	99.99 -
DIN24184 (liquid paraffin mist, particles 0.3-0.5 micron)	99.97 -
US Military Standard 282, Dop test	99.97 -

The filters used will collect 99.99 % af particles larger than 3 micron.

The brushes are powered by an electrical drill with electronic speed regulation, e.g. a Bosch SLR 500 RLE or Bosch 1159.7 500 watt.